SIR,

Initial Performance of New Brookhaven Linac†

The first section of the BNL 200-MeV proton linac has been successfully operated, accelerating a current of 200 mA to 10 MeV. The linac is very similar to the NAL injector‡ so will not be described here in detail. Briefly, the operational equipment consists of the Cockcroft–Walton generator, duoplasmatron source, high gradient accelerating column, beam transport from column to first cavity (including two bunchers), the cavity with its 201.25 MHz rf system and quadrupole focusing system and a 10-MeV analysis station. All of the equipment is in its final position in the linac building. The 10-MeV analysis station was a temporary setup in the location which now is occupied by the second cavity.

Complete beam monitoring and analysis equipment has been installed. Both before and after the cavity there are current transformers, quartz viewing flags and emittance devices for both horizontal and vertical planes. In addition, following the cavity there was a magnetic spectrometer for recording beam momentum and momentum spread.

A beam was first accelerated to 10 MeV in March and was followed by several months of careful measurement and optimization studies before peak performance was obtained. The most important feature in tuning up is the proper matching of beam emittance to the acceptance at the beginning of the cavity.

The optimum beam conditions are given in the table below.

Operations were carried out at pulse rates of 1 and 10 pulses per second and pulse lengths from 20 to 150 μsec. In addition, deuterons were accelerated in the $2\beta\lambda$ mode to 5 MeV using 400 kV injection energy. A peak current of 18 mA was achieved without complete optimization of the system.

George W. Wheeler, Kenneth Batchelor and Th. J. M. Sluyters
Brookhaven National Laboratory,
Upton, New York, USA

† Work performed under the auspices of the U.S. Atomic Energy Commission.

‡ C. D. Curtis *et al.*, *Particle Accelerators*, **1**, 93 (1970).

Injection energy:	780 kV	Current at base of column	0.400 A
Emittance at input, Horiz.	19.5π cm-mrad	Current entrance of cavity	0.270 A
Vert.	19.5π cm-mrad	Current at 10 MeV	0.210 A
Emittance at 10 MeV, Horiz.	6π cm-mrad	Energy	10.4 MeV
Vert.	7.5π cm-mrad	Energy Spread (FWHM)	0.5 MeV
Cavity synchronous phase	$-32°$	Cavity Transmission	79%

Received 10 August 1970